NASA STTR 2006 Phase I Solicitation

T1.01   Information Technologies for System Health Management, Autonomy, and Scientific Exploration

Lead Center: ARC

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Information technology is a key element in the successful achievement of NASA's strategic goals. Modern tools and techniques have the capability to redefine many design and operational processes as well as enable grand exploration and science investigations. This subtopic seeks innovative solutions to the following information technology challenges:

- Onboard methods that monitor system health and then automatically reconfigure to respond to failures and sustain progress toward high-level goals. Special emphasis will be on computational techniques for coordinating multi-agent systems in the presence of anomalies or threats. Proposals should focus on data analysis and interpretation rather than development of new sensors;

- Onboard, real-time health management systems that perform quickly enough to monitor a flight control system (including spacecraft and fixed or rotary wing aircraft) in a highly dynamic environment and respond to anomalies with suggested recovery or mitigation actions;

- Integrated software capabilities that allow automated science platforms, such as rovers, to respond to high-level goals. This could include perception of camera and other sensor data, position determination and path planning, science planning, and automated analysis of resulting science data;

- Data fusion, data mining, and automated reasoning technologies that can improve risk assessments, increase identification of system degradation, and enhance scientific understanding;

- Techniques for interconnecting and understanding large heterogeneous or multidimensional data sets or data with complex spatial and/or temporal dynamics;

- Computational and human/computer interface methodologies for inferring causation from associations and background knowledge for scientific, engineering, control, and performance analyses;

- Innovative communication, command, and control concepts for autonomous systems that require interaction with humans to achieve complex operations.